Cathode-Ray Oscilloscope

(C.R.O)

Name : Ali Elwafdy Ali Mohamed

Section : 6

الاسم : على الوفدى على محمد

سيكشن : 6

Introduction

An oscilloscope (commonly abbreviated to scope or O-scope) is a type of electronic test instrument that allows signal voltages to be viewed, usually as a two-dimensional graph of one or more electrical potential differences (vertical axis) plotted as a function of time or of some other voltage (horizontal axis). Although an oscilloscope displays voltage on its vertical axis, any other quantity that can be converted to a voltage can be displayed as well. In most instances, oscilloscopes show events that repeat with either no change, or change slowly. The oscilloscope is one of the most versatile and widely-used electronic instruments.

Oscilloscopes are widely used when it is desired to observe the exact wave shape of an electrical signal. In addition to the amplitude of the signal, an oscilloscope can measure the frequency, show distortion, show the time between two events (such as pulse width or pulse rise time), and show the relative timing of two related signals. Some better modern digital oscilloscopes can analyze and display the spectrum of a repetitive event. Special-purpose oscilloscopes, called spectrum analyzers, have sensitive inputs and can display spectra well into the GHz range. A few .oscilloscopes that accept plug-ins can display spectra in the audio range

Oscilloscopes are used in the sciences, medicine, engineering, telecommunications, and industry. General-purpose instruments are used for maintenance of electronic equipment and laboratory work. Special-purpose oscilloscopes may be used for such purposes as analyzing an automotive ignition system, or to display the waveform of the .heartbeat

Originally all oscilloscopes used cathode ray tubes as their display element and linear amplifiers for signal processing, but modern oscilloscopes can have LCD or LED screens, high-speed analog-to-digital converters and digital signal processors. Although not as commonplace, some oscilloscopes used storage CRTs to capture single events and display them for a limited time. Oscilloscope peripheral modules for general purpose laptop or desktop personal computers use the computer's display, and can turn them into useful and flexible test instruments.

Historical Background

Hand-drawn Oscillograms

The earliest method of creating an image of a waveform was through a laborious and painstaking process of measuring the voltage or current of a spinning rotor at specific points around the axis of the rotor, and noting the measurements taken with a galvanometer. By slowly advancing around the rotor, a general standing wave can be drawn on graphing paper by recording the degrees of rotation and the meter strength at each .position

This process was first partially automated by ***Jules François Joubert*** *with his step-by-step method of wave form measurement. This consisted of a special single-contact commutator attached to the shaft of a spinning rotor. The contact point could be moved around the rotor following a precise degree indicator scale and the output appearing on a galvanometer, to be hand-graphed by the technician. This process could only produce a very rough waveform approximation since it was formed over a period of several thousand wave cycles, but it was the first step in .the science of waveform imaging*

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